Advanced Receiver Research

Johnnycake airport
Route 4
Harwinton Conn 06791

INSTRUCTION SHEET
SP50VDG
SP144VDG
SP220VDG
SP432VDG

Series SPXXXVDG preamplifiers have been specifically designed for amateur use. Each unit is housed in a completely shielded, rugged, custom aluminum enclosure. To maintain a high degree of rf shielding a feedthrough capacitor is used for the dc connection. A solder-lug terminal adjacent to the feedthrough capacitor is provided for the dc ground connection. Each and every preamplifier has been precision aligned on our Hewlett-Packard HP8970A/HP346A noise figure measuring equipment and should not need further adjustment.

The SPXXXVDG preamplifiers are suited for fixed, mobile or portable operation. Power supply requirements are 11-16 Vdc at 80 mA. Small size, low power consumption and rugged construction make these preamplifiers ideal for installation within existing equipment or systems.

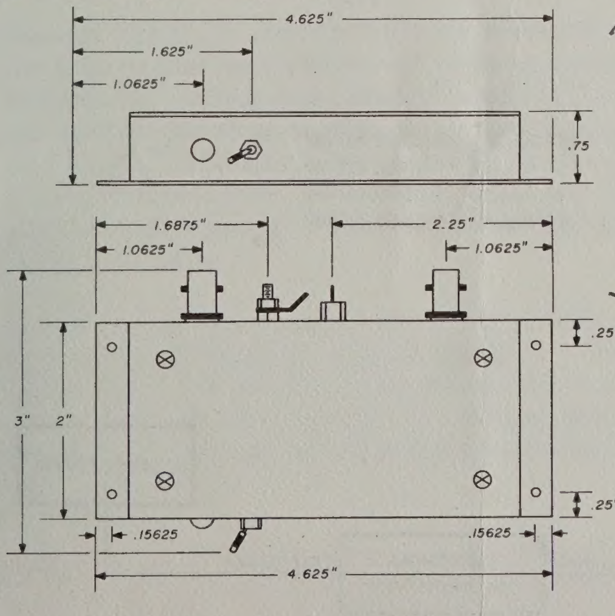
Theory and Operation

Signals arriving at the antenna terminal are routed to the gate of the GaAsFET through an L network. The source of the device is held above ground by R1 which develops the appropriate gate-source voltage. C2 and C3 ground the source for rf. A broadband ferrite transformer is used to match the drain circuit and provide a low impedance load for the GaAsFET. The positive supply line is passed through a .001 μF feedthrough capacitor to maintain effective shielding. D1 protects the preamplifier against accidental application of reverse polarity voltage. U1 provides a regulated 5-volt supply for the GaAsFET and protects the device from power supply transients.

When the transceiver is keyed a small amount of rf is rectified by D4 and D5 causing Q2 to conduct. Bias on Q3 is removed and relays RL1 and RL2 return to their normally open position. Power from the transceiver is fed through to the antenna. As shipped from the factory, the relay dropout delay capacitor is connected to ground. This prevents the relays from following cw keying or speech patterns. For fm operation the delay is not required and may be defeated by removing the jumper between the two circuit board terminals adjacent to the transceiver ("trans") connector. The front panel LED indicates the on/off status of the preamplifier.

Interconnection to a transceiver is quite straightforward. A coaxial cable is used to connect the output of the preamplifier (labelled "trans") to the transceiver antenna terminal. The antenna is connected to the preamplifier input terminal (labelled "ant"). In systems where power amplifiers are used, the inline preamplifiers may be installed between the transceiver or transverter and power amplifier. Connected in this manner the preamplifier need only handle the transceiver power (25 watts or less). See Figure 1. Use of the preamplifier between the power amplifier and the antenna will cause preamplifier relay failure. A power supply capable of delivering proper voltage and current is connected to the lugs marked "vdc" and "gnd." Vdc is positive and gnd is negative.

ATV— Rcv Audio — 426.25+4.50 =
430.75



420-450 MC
no retuning

Specifications

Model	Bandwidth (1dB)	Noise Figure	Gain	Compression (1dB)
SP50VDG	4 MHz	<0.55 dB	24 dB	+12 dBm
SP144VDG	7 MHz	<0.55 dB	24 dB	+12 dBm
SP220VDG	12 MHz	<0.55 dB	24 dB	+12 dBm
→ SP432VDG	40 MHz	<0.55 dB	24 dB	+12 dBm

Supply Voltage: 11-16 Vdc
Supply Current: transmit: 10 mA max
receive: 80 mA max.
Weight: 4.0 oz.
Through mode VSWR: 1.25 max.
Through mode attenuation: 0.5 dB max.
Minimum power to activate switching circuitry: 0.5 watt.

Return [illegible]

RA418A

If results are better when returned then the Amp doesn't see 50Ω

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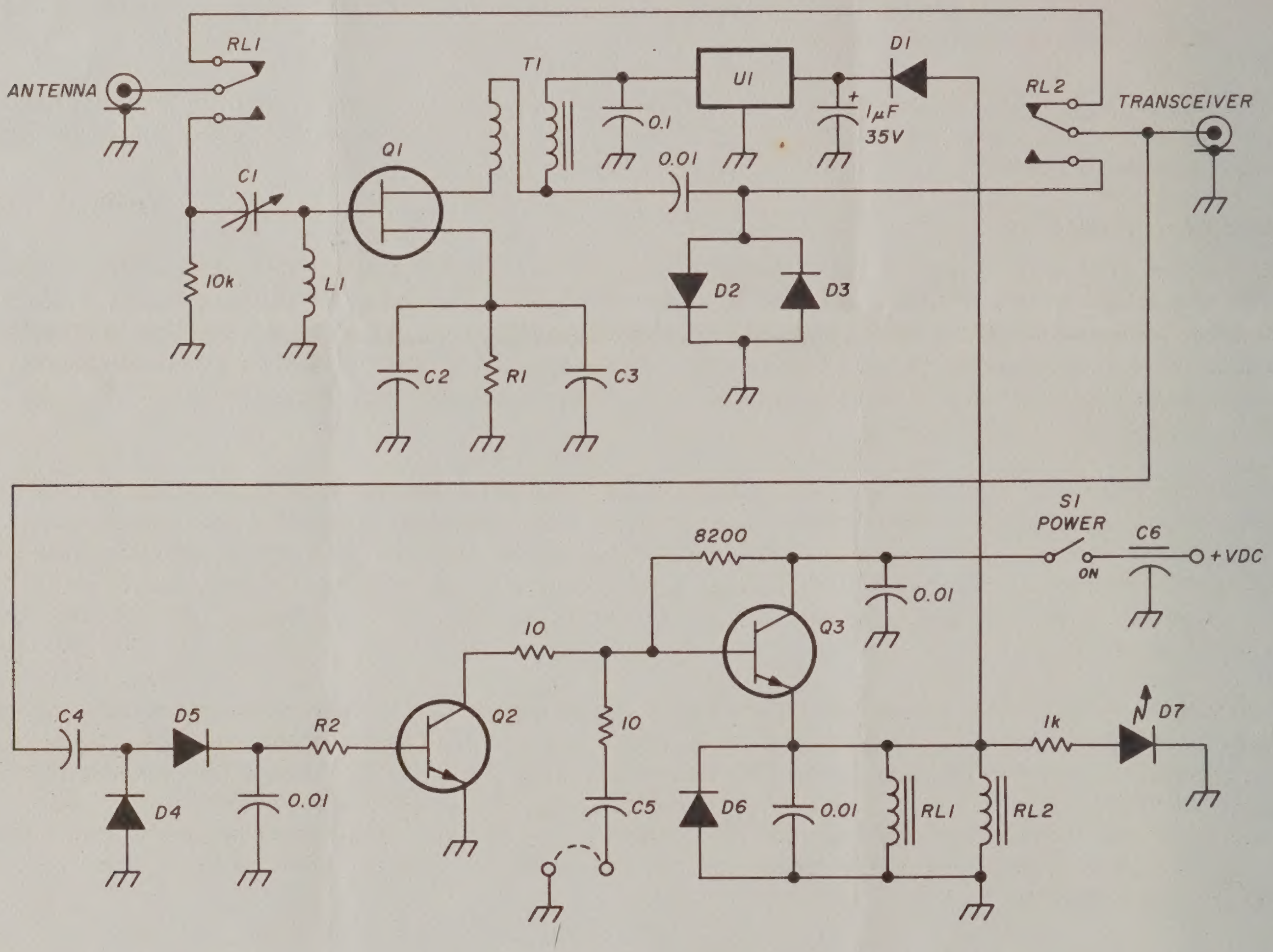
Warranty

All Advanced Receiver Research products are warranted against defects in materials and workmanship. This warranty applies for one year from the date of delivery. We will repair or replace products which prove to be defective during the warranty period provided they are returned to Advanced Receiver Research. Shipment should not be made without prior authorization by Advanced Receiver Research. No other warranties are expressed or implied. We are not liable for consequential damages.

This warranty does not apply to any product repaired or altered by persons not authorized by Advanced Receiver Research, or not in accordance with instructions furnished by Advanced Receiver Research. If the unit is found to be defective as a result of misuse, improper repair, or abnormal conditions of operation, repairs will be billed at cost.



Model	C1	C4	L1	T1
SP50VDG	20 pF	10 pF	21T No. 30 T-25-12	16T No. 32 FT-23-61 bifilar
SP144VDG	5 pF	10 pF	6T No. 20 0.3125 dia.	15T No. 32 FT-23-63 bifilar
SP220VDG	5 pF	10 pF	5T No. 20 0.250 dia.	11T No. 32 FT-23-63 bifilar
SP432VDG	5 pF	5 pF	3T No. 20 0.125 dia.	5T No. 32 FT-23-63 bifilar

All Models:

C2, C3 — .001 μF chip
C5 — 47 μF
C6 — .001 μF feedthrough
D1-D6 — 1N4152
D7 — LED
Q1 — MGF-1402
Q2,Q3 — MPS2222A
R1 — 100-ohm chip
R2 — 1000 ohm
RL1, RL2 — Omron G4Y-152P
S1 — SPST miniature
U1 — MC78L05

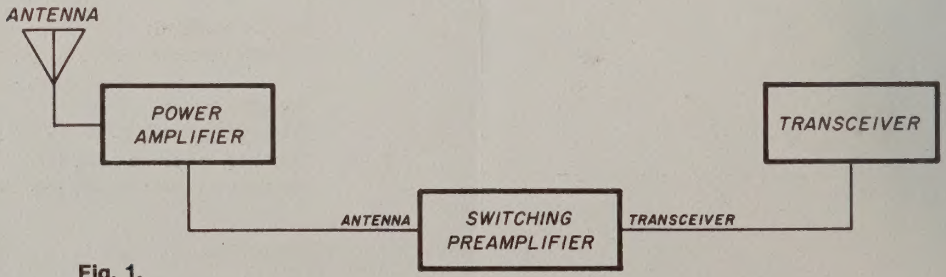


Fig. 1.

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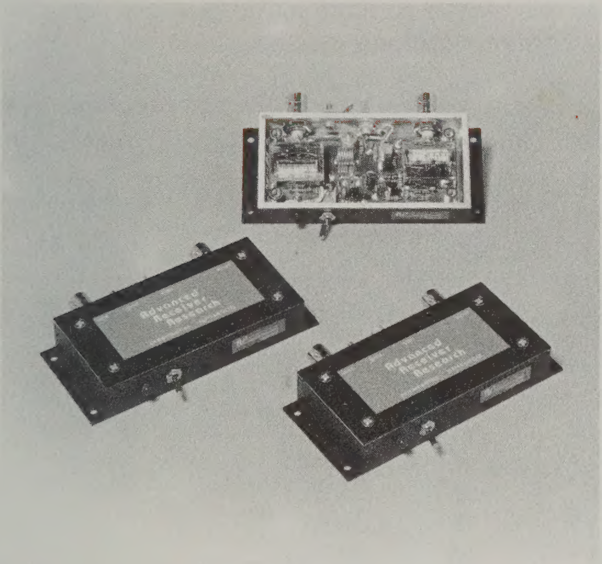
High Performance Hf, Vhf, Uhf Inline Preamplifiers



Features:

- *Low noise figure*
- *Automatically switches off during transmit*
- *25 watt through power capability*
- *No transceiver modification necessary*
- *High immunity to overload*
- *Completely shielded*
- *Small size*
- *Rugged low profile custom enclosure*

Series SPXXXVD, SPXXXVDA and SPXXXVDG preamplifiers have been designed for the most demanding amateur, commercial and military applications. Each model has been optimized for lowest noise figure consistent with excellent strong signal handling capability. These preamplifiers are suitable for use in any system. Each preamplifier is housed in a rugged low profile custom aluminum enclosure finished with military grade acrylic-urethane enamel. Female BNC coaxial fittings are provided for the input and output connections. Other connections or connector combinations are available (contact factory). Complete rf shielding is maintained with a feed-through capacitor for the dc power connection. Mounting holes, suitable for no. 4 hardware, are located at each corner of the bottom plate.

Several models of preamplifiers are available for most frequency ranges. Selection of the most suitable model for a particular application will depend primarily on the noise figure and overload characteristics required. Preamplifier models using dual-gate MOSFET and bipolar transistor devices (part numbers with suffix VD or VDA) are suitable for most scatter, tropo, satellite, ATV, repeater and radio telescope applications. Gallium-arsenide FET (GaAsFET) preamplifiers (part numbers with suffix VDG) provide the lowest noise figures and highest immunity to overload of any preamplifier types. These preamplifiers would be well-suited for very low signal level work, either terrestrial or earth-moon-earth (EME) communications, or in areas where strong signal levels are normally a problem.

Amplifying devices used in the preamplifiers are as follows: SP28VD, SP50VD, SP144VD, SP220VD — 3N204; SP144VDA, SP220VDA — 3SK48; SP432VD — MRF-901; SP432VDA — NE64535; SP50VDG, SP144VDG, SP220VDG, SP432VDG — MGF-1402. Special attention has been paid to power supply transient protection and destructive gate voltage charge protection in the GaAsFET preamplifiers. Each and every preamplifier is precision aligned on our Hewlett-Packard HP8970A/HP346A noise figure measuring equipment and should provide long trouble-free operation.

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Inline preamplifiers use rf sensing to detect the presence of transmitter power and immediately switch the preamplifier out of the line. The rf relays used in the preamplifier will handle up to 25 watts of rf power. In systems where power amplifiers are used, the inline preamplifiers may be installed between the transceiver or transverter and power amplifier. Connected in this manner, the preamplifier need only handle the transceiver power (25 watts or less).

All preamplifiers are designed to be powered by a 11-16 volt dc source at a maximum of 80 mA. Low power consumption along with the small size make these preamplifiers ideal for installation within existing equipment or systems, or for remote mounting at the antenna. Mounting the preamplifier at the antenna will provide the best system noise figure.

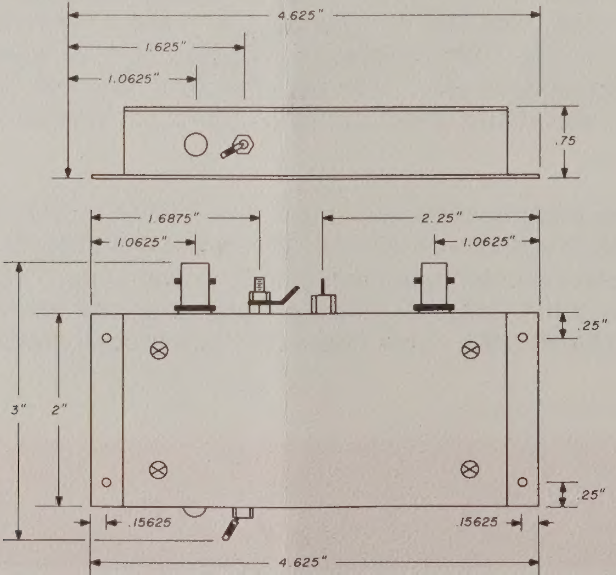
All Advanced Receiver Research products are covered by a full one year warranty. Instruction sheet and schematic diagram furnished on request. If you're serious about hf, vhf, uhf and microwave communications, make Advanced Receiver Research high performance equipment a part of your communications system.

Note: *Advanced Receiver Research manufactures a broad line of frequency converters, low noise preamplifiers and broadband amplifiers for many frequency ranges not listed here. Contact the factory with your specific requirements.*

Specifications

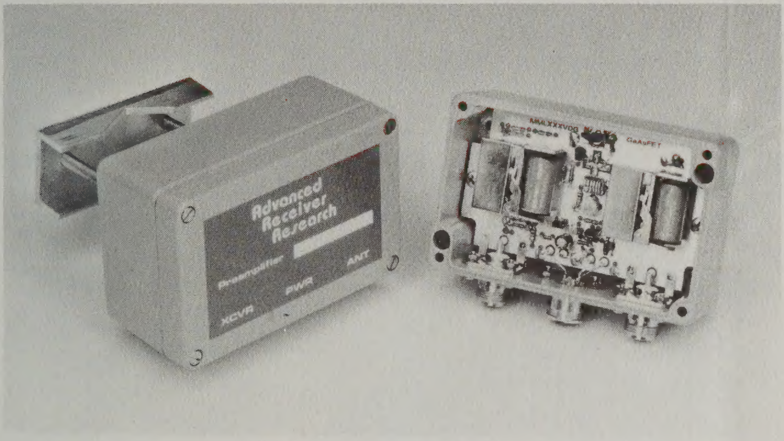
Model	Freq. Range (MHz)	N.F. (dB)	Gain (dB)	1dB Comp. (dBm)	1dB Bandwidth (MHz)	Device Type
SP28VD	*28-30*	*<1.2*	*15*	*0*	*2.5*	*DGFET*
SP50VD	*50-54*	*<1.4*	*15*	*0*	*5*	*DGFET*
SP50VDG	*50-54*	*<0.55*	*24*	*+12*	*4*	*GaAsFET*
SP144VD	*144-148*	*<1.6*	*15*	*0*	*8*	*DGFET*
SP144VDA	*144-148*	*<1.1*	*15*	*0*	*8*	*DGFET*
SP144VDG	*144-148*	*<0.55*	*24*	*+12*	*7*	*GaAsFET*
SP220VD	*220-225*	*<1.9*	*15*	*0*	*10*	*DGFET*
SP220VDA	*220-225*	*<1.3*	*15*	*0*	*10*	*DGFET*
SP220VDG	*220-225*	*<0.55*	*20*	*+12*	*12*	*GaAsFET*
SP432VD	*420-450*	*<1.9*	*15*	*–20*	*40*	*Bipolar*
SP432VDA	*420-450*	*<1.2*	*17*	*–20*	*40*	*Bipolar*
SP432VDG	*420-450*	*<0.55*	*16*	*+12*	*40*	*GaAsFET*

Supply voltage: *11-16 Vdc*
Supply current: *transmit: 10 mA max.*
receive: 80 mA max.
Weight: *4.0 oz.*
Through mode VSWR: *1.25 max.*
Through mode attenuation: *0.5 dB max.*
Minimum power to activate switching circuitry: *0.5 watt*



Ar^2 COMMUNICATIONS PRODUCTS

High Performance Hf, Vhf, Uhf 160 Watt, Mast Mount Preamplifiers



Features:

- *Low noise figure*
- *Automatically switches off during transmit*
- *160 watt through power capability*
- *No transceiver modification necessary*
- *High immunity to overload*
- *Completely shielded*
- *Rugged low profile custom enclosure*
- *Weatherproof*
- *Mounts to 1" through 2-1/8" diameter masts*

Series MMLXXXVD, MMLXXXVDA and MMLXXXVDG preamplifiers have been designed for the most demanding amateur, commercial and military applications. This series of preamplifiers are specifically designed for mast mounting. Locating the preamplifier close to the antenna reduces feedline losses ahead of the preamplifier lowering system noise figure. Each preamplifier is housed in a rugged, weatherproof custom aluminum enclosure. An aluminum and stainless steel clamp assembly facilitates mounting of the preamplifier to masts of 1" through 2-1/8" diameter. This clamp assembly may be removed for in station mounting. Female N coaxial fittings are provided for the input and output rf connections. DC and control functions are made through a DIN type connector (mating connector for control line supplied).

Several models of preamplifiers are available for most frequency ranges. Selection of the most suitable model for a particular application will depend primarily on the noise figure and overload characteristics required. Preamplifier models using dual-gate MOSFET and bipolar transistor devices (part numbers with suffix VD or VDA) are suitable for most scatter, tropo, satellite, ATV, repeater and radio telescope applications. Gallium-arsenide FET (GaAsFET) preamplifiers (part numbers with suffix VDG) provide the lowest noise figures and highest immunity to overload of any preamplifier types. These preamplifiers would be well-suited for very low signal level work, either terrestrial or earth-moon-earth (EME) communications, or in areas where strong signal levels are normally a problem.

Amplifying devices used in the preamplifiers are as follows: MML28VD, MML50VD, MML144VD, MML220VD — 3N204; MML144VDA, MML220VDA — 3SK48; MML432VD — MRF-901; MML432VDA — NE64535; MML50VDG, MML144VDG, MML220VDG, MML432VDG — MGF-1402. Special attention has been paid to power supply transient protection and destructive gate voltage charge protection in the GaAsFET preamplifiers. Each and every preamplifier is precision aligned on our Hewlett-Packard HP8970A/HP346A noise figure measuring equipment and should provide long trouble-free operation.

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MML series preamplifiers use rf sensing to detect the presence of transmitter power and immediately switch the preamplifier out of line. The rf relays used in the preamplifier will handle up to 160 watts of rf power. In systems where higher power amplifiers are used, the preamplifier may be installed between the driver and final power amplifier. MML series preamplifiers may also be hard keyed with either a GND to transmit or VDC to transmit command. If hard keying of the preamplifier is planned, we recommend the use of a sequencer such as the TRS04VD. Review the TRS04VD instruction sheet for more detailed information.

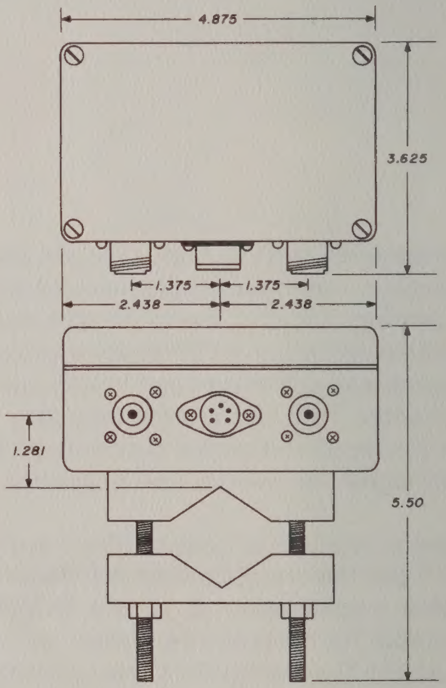
All preamplifiers are designed to be powered by a 11-16 volt dc source at a maximum of 180 mA. Low power consumption along with the small size make these preamplifiers ideal for installation within existing equipment or systems, or for remote mounting at the antenna. Mounting the preamplifier at the antenna will provide the best system noise figure.

All Advanced Receiver Research products are covered by a full one year warranty. Instruction sheet and schematic diagram furnished on request. If you're serious about hf, vhf, uhf and microwave communications, make Advanced Receiver Research high performance equipment a part of your communications system.

Note: *Advanced Receiver Research manufactures a broad line of frequency converters, low noise preamplifiers and broadband amplifiers for many frequency ranges not listed here. Contact the factory with your specific requirements.*

Specifications

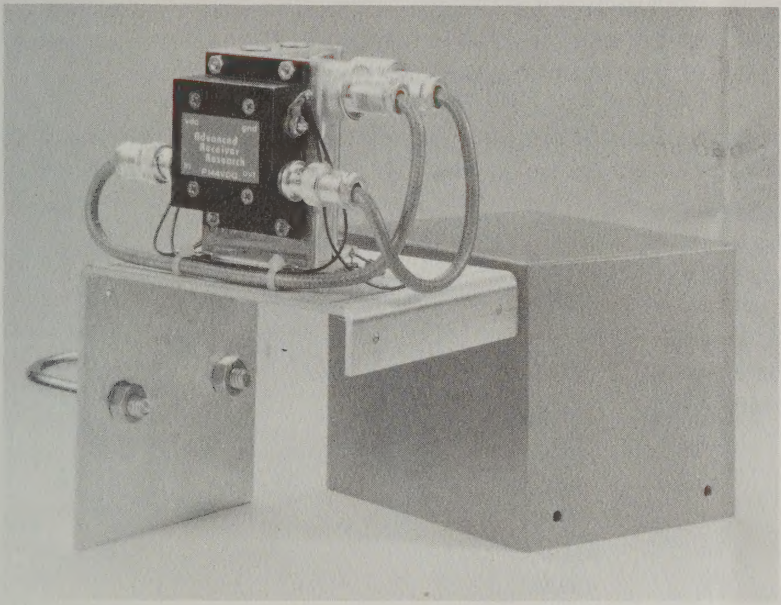
Model	Freq. Range (MHz)	N.F. (dB)	Gain (dB)	1dB Comp. (dBm)	1dB Bandwidth (MHz)	Device Type
MML28VD	*28-30*	*<1.2*	*14*	*0*	*2.5*	*DGFET*
MML50VD	*50-54*	*<1.4*	*14*	*0*	*5*	*DGFET*
MML50VDG	*50-54*	*<0.55*	*24*	*+12*	*4*	*GaAsFET*
MML144VD	*144-148*	*<1.6*	*14*	*0*	*8*	*DGFET*
MML144VDA	*144-148*	*<1.1*	*14*	*0*	*8*	*DGFET*
MML144VDG	*144-148*	*<0.55*	*22*	*+12*	*7*	*GaAsFET*
MML220VD	*220-225*	*<1.9*	*14*	*0*	*10*	*DGFET*
MML220VDA	*220-225*	*<1.3*	*14*	*0*	*10*	*DGFET*
MML220VDG	*220-225*	*<0.55*	*20*	*+12*	*12*	*GaAsFET*
MML432VD	*420-450*	*<1.9*	*14*	*−20*	*40*	*Bipolar*
MML432VDA	*420-450*	*<1.2*	*16*	*−20*	*40*	*Bipolar*
MML432VDG	*420-450*	*<0.6*	*16*	*+12*	*40*	*GaAsFET*



Supply voltage: *11-16 Vdc*
Supply current: *transmit: 10 mA max.*
receive: 180 mA max.
Weight: *1 lb. 13 oz.*
Power handling: *160 watts*
Through mode VSWR: *1.25 max.*
Through mode attenuation: *0.5 dB max.*
Minimum power to activate switching circuitry: *5 watts*

Ar² COMMUNICATIONS PRODUCTS

High Performance Hf, Vhf, Uhf High Power Mast Mounted Preamplifiers



Features:

- *Low noise figure*
- *High through power capability*
- *High immunity to overload*
- *Completely shielded*
- *Small size*
- *Rugged, weatherproof custom enclosure*
- *Mounts to 2" or smaller diameter mast*
- *Available with any ARR P series preamplifier installed*

Series MMXXXVDX are preamplifier/relay systems designed for the most demanding amateur, commercial and military applications. These preamplifier systems are specifically designed for mast mounting. Locating the preamplifier close to the antenna reduces feedline losses ahead of the preamplifier lowering system noise figure. Each preamplifier/relay is housed in a rugged, weatherproof custom aluminum enclosure. A clamp assembly facilitates mounting of the preamplifier to 2" or smaller diameter masts. The aluminum cover is finished in sky blue acrylic urethane enamel.

MMXXXVDX series preamplifiers use DPDT transfer relays to switch the preamplifier out of line during transmit and in circuit during receive periods allowing a single feedline to be used for both transmit and receive. The relay is constructed for ARR by Dow Key/Kilovac and provides −100 dB of isolation to protect sensitive preamplifiers. Rugged, gold plated contacts are rated for high power operation — 1000 watts continuous to 400 MHz and 750 watts continuous at 432 MHz. Insertion loss is rated at 0.1 dB maximum and VSWR is 1.15 maximum. N connectors are provided for rf connections and an F connector for the control line connection.

MMXXXVDX series are available with any of the ARR P series preamplifiers installed. Performance characteristics are shown in the specification section. The MMXXXVDX series is also available without preamplifier installed. Configured in this manner the package contains the relay, enclosure and all internal rf and dc cables. An operational system simply requires the installation of an ARR P series preamplifier.

MMXXXVDX series preamplifiers are designed for hard keying transmit/receive control only since rf sense switching is impractical at high power levels. +12 VDC is required to activate the preamplifier for receive and no voltage (open) is required for transmit.

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Transmit/receive relay sequencing is mandatory if preamplifier/relay failure is to be avoided. A circuit such as the ARR TRS04VD will provide sequentially keyed outputs that accurately control the timing of all system transmit/receive changeovers. Preamplifier/relay failures are common in systems where all relays are keyed simultaneously. In these systems rf is applied while relay contacts are bouncing and not fully closed arcing the relay contacts and causing permanent damage. Also, if the relay is not fully closed, excessive power can be applied to the receive side of the relay causing preamplifier failure. Review the TRS04VD instruction sheet for more detailed information.

All preamplifiers are designed to be powered by a 11-14 volt dc source at a maximum of 280 mA. Low power consumption along with the small size make these preamplifiers ideal for installation within existing equipment or systems, or for remote mounting at the antenna. Mounting the preamplifier at the antenna will provide the best system noise figure.

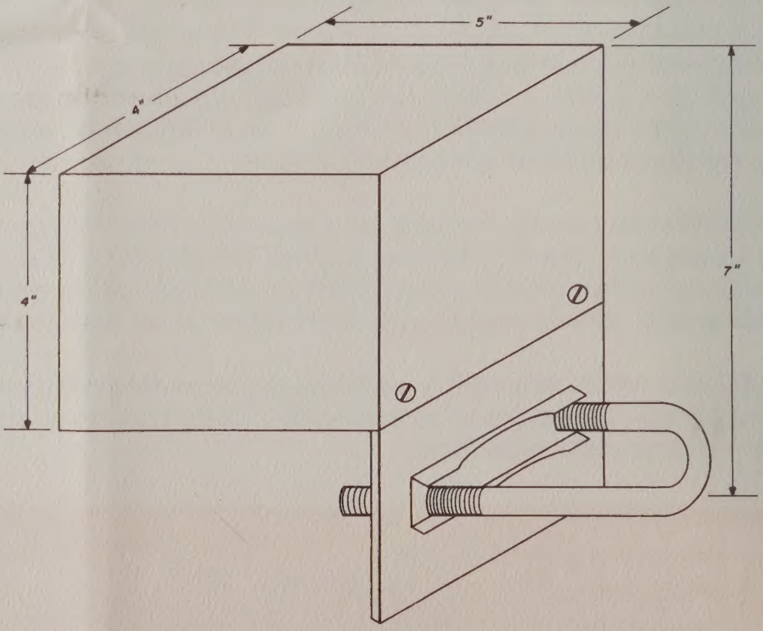
All Advanced Receiver Research products are covered by a full one year warranty. Instruction sheet and schematic diagram furnished on request. If you're serious about hf, vhf, uhf and microwave communications, make Advanced Receiver Research high performance equipment a part of your communications system.

NOTE: *Advanced Receiver Research manufactures a broad line of frequency converters, low noise preamplifiers and broadband amplifiers for many frequency ranges not listed here. Contact the factory with your specific requirements.*

Specifications

Model	Freq. Range (MHz)	N.F. (dB)	Gain (dB)	1dB Comp. (dBm)	1dB Bandwidth (MHz)	Device Type
MM28VD	28-30	<1.2	15	0	2.5	DGFET
MM50VD	50-54	<1.4	15	0	5	DGFET
MM50VDG	50-54	<0.55	24	+12	4	GaAsFET
MM144VD	144-148	<1.6	15	0	8	DGFET
MM144VDA	144-148	<1.1	15	0	8	DGFET
MM144VDG	144-148	<0.55	24	+12	7	GaAsFET
MM220VD	220-225	<1.9	15	0	10	DGFET
MM220VDA	220-225	<1.3	15	0	10	DGFET
MM220VDG	220-225	<0.55	20	+12	12	GaAsFET
MM432VD	420-450	<1.9	15	−20	40	Bipolar
MM432VDA	420-450	<1.2	17	−20	40	Bipolar
MM432VDG	420-450	<0.55	16	+12	40	GaAsFET

Supply voltage: *transmit: 0 Vdc*
receive: 11-14 Vdc
Supply current: *transmit: 0 mA*
receive: 280 mA max.
Weight: *1 lb. 13 oz.*
Power Handling: *1000 watts below 432 MHz*
750 watts at 432 MHz
Through mode VSWR: *1.15 max.*
Through mode attenuation: *0.1 dB max.*



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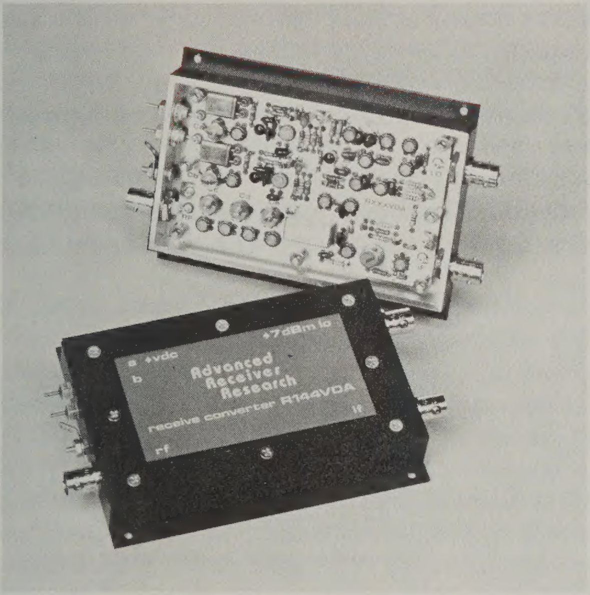
High Performance Vhf Receive Converters



Features:

- •Overload proof circuitry— + 23 dBm input intercept
- •High out-of-band signal rejection
- •Low LO spurious
- • + 7 dBm LO output for transmit converter
- •Crystal netting for exact frequency calibration
- •Dual frequency range (with second optional crystal)
- •Rugged low profile custom enclosure

Series RXXXVDA receive converters have been designed with one main objective—absolute high performance. Today's crowded bands require receiving equipment that can function in the presence of extremely strong in-band signals without suffering from desensitization, cross modulation or intermodulation distortion (IMD). In addition, the system must be immune to out-of-band interference in the forms of image, spurious and i-f signals. Series RXXXVDA receive converters are the first units available to fully address these needs. From input connector to output connector each stage has been meticulously engineered for absolute optimum performance. Conservative ratings are listed in the specifications chart.

High performance circuitry begins right at the converter input with a 3-pole Chebyshev bandpass filter to eliminate interference causing out-of-band signals. This filter is characterized by extremely sharp skirts, flat passband, excellent ultimate attenuation and low insertion loss. Following this filter is a diode ring mixer. As in any well designed receiving system, the mixer will always be the weak link in the chain. The effect of this weak link is minimized through the use of a high intercept MCL diode ring. I-f output from the mixer passes through a diplexer which ensures proper termination across the hf, vhf and uhf spectrum. I-f signal energy is amplified by a 20 dB gain rugged bipolar amplifier stage which is biased for an output intercept of + 40 dBm.

The 10 dB noise figure associated with this high performance converter system dictates that an external preamplifier be used. In general, any preamplifier with a noise figure of 0.5 - 1.8 dB with an associated gain of 10 -15 dB will be sufficient to reduce the system noise to a point where sensitivity will be limited by atmospheric/man made noise. Caution should be exercised when selecting preamplifier(s) to avoid excessive signal gain as the amount of preamplifier gain reduces the converter intercept by a corresponding amount.

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Local oscillator (LO) injection for the diode ring mixer and the LO output for a transmit converter, is provided by a high performance oscillator strip. 22.0, 116.0 and 96.0 MHz crystals are used for the R50VDA, R144VDA and R220VDA converters, respectively. Oscillator output is buffered (doubled to 192.0 MHz in the R220VDA) and passes through a 7-pole Chebyshev low-pass filter to remove harmonic energy. A 5-pole Chebyshev high-pass filter in the R220VDA removes the fundamental (96 MHz) energy from the signal. Filtered oscillator energy is split into two paths by a Wilkinson power divider; one path is the LO output for a transmit converter and the second path is filtered by an additional 5-pole Chebyshev low-pass filter and applied to the receive diode ring mixer through a resistive pad. Two separate oscillator stages are provided in the R50VDA and R144VDA for complete band coverage. Diode switched crystals are used in the R220VDA. Converters are supplied with one crystal for the band segments listed in the specifications chart. Optional crystals are available for additional band segments. Crystal netting ensures exact frequency conversion accuracy.

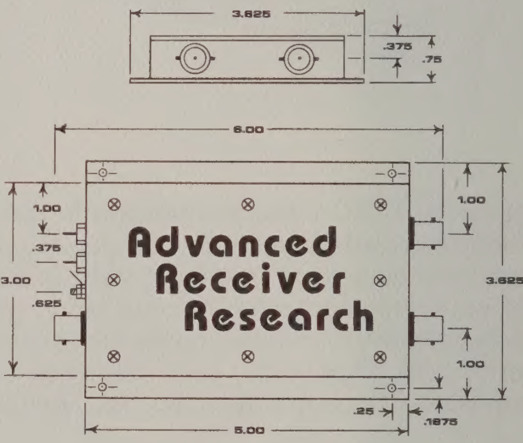
RXXXVDA converters are housed in a rugged low profile custom aluminum enclosure with a durable black epoxy finish. As with all Advanced Receiver Research products, these receive converters are covered by a full one year warranty. Instruction sheet and schematic diagram furnished on request.

If you're serious about hf, vhf, uhf and microwave communications make Advanced Receiver Research high performance equipment a part of your communications system.

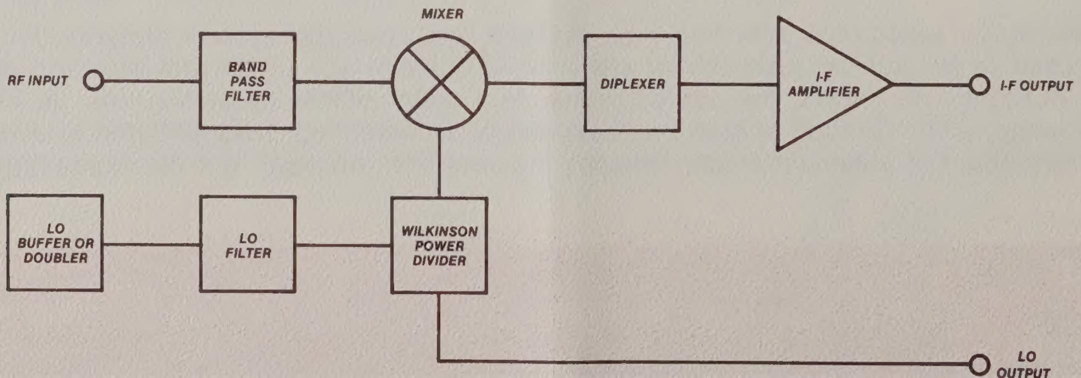
Note: *Advanced Receiver Research manufactures a broad line of frequency converters, low-noise preamplifiers and broadband amplifiers for many frequency ranges not listed here. Contact the factory with your specific requirements.*

Specifications:

Model	**R50VDA**	**R144VDA**	**R220VDA**
Input frequency			
standard	*50.0-52.0*	*144.0-146.0*	*220.0-222.0*
optional	*52.0-54.0*	*146.0-148.0*	*222.0-224.0*
I-f	*28.0-30.0*	*28.0-30.0*	*28.0-30.0*
Noise figure	*10 dB*	*10 dB*	*10 dB*
Conversion gain	*12 dB*	*12 dB*	*12 dB*
Input intercept	*+23 dBm*	*+23 dBm*	*+23 dBm*
Image rejection	*65 dB*	*65 dB*	*65 dB*
I-f rejection	*70 dB*	*80 dB*	*80 dB*
Spurious rejection	*65 dB*	*65 dB*	*65 dB*
LO output	*+7 dBm*	*+7 dBm*	*+7 dBm*
LO spurious attenuation	*50 dB*	*50 dB*	*50 dB*
Frequency accuracy:	*exact*		
Supply voltage:	*13 volts nominal regulated (12 - 16 Vdc)*		
Supply current:	*80 mA*		
Weight:	*8 ounces*		



High-Performance Converter block diagram.



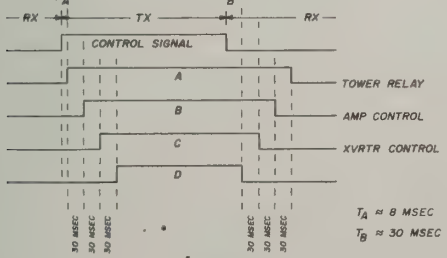
Ar² COMMUNICATIONS PRODUCTS

TRS04VD
Transmit/Receive Sequencer

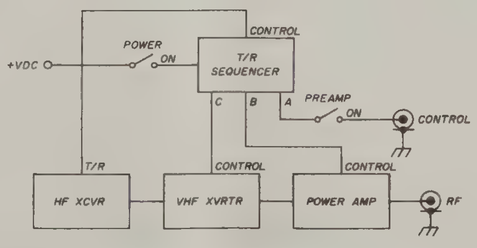
The TRS04VD is a transmit/receive control circuit designed primarily for use with vhf/uhf transverter or transceiver, power amplifier and mast mounted preamplifiers. Sequentially keyed outputs from the TRS04VD accurately control the timing of all system transmit/receive changeovers eliminating coaxial relay and preamplifier failure. Such failures are common in systems where all relays are keyed simultaneously. In these systems rf is applied while relay contacts are bouncing and not fully closed arcing the relay contacts and causing permanent damage. Also, if the relay is not fully closed, excessive power can be applied to the receive side of the relay causing preamplifier failure. Ruining a good coaxial relay and GaAsFET preamplifier can be an expensive proposition! The TRS04VD eliminates these problems by preventing the flow of rf until all system relays have had ample time to settle.

A timing diagram best illustrates the operation of the TRS04VD. Applying a control signal from the hf transceiver initiates the rx to tx transition. Eight milliseconds after the control signal is received by the TRS04VD, circuit A is activated switching the mast mounted relay to its transmit position. Thirty milliseconds later circuit B is activated removing cutoff bias from the power amplifier. Thirty milliseconds after that circuit C is activated allowing the transverter to switch to the transmit mode. A fourth circuit, D, is provided for those systems that require the switching of an additional system component such as another relay or driver amplifier. Tx to rx transition occurs when the control signal is removed and the whole sequence is reversed. Circuit D opens first, followed by C, B and A at 30 millisecond intervals. Since coaxial relays require from 10 - 25 milliseconds for complete contact closure the TRS04VD allows each relay to fully close before activating the following circuit. TRS04VD outputs A, B, C and D are SPST reed relay contacts isolated from ground. Consequently positive or negative polarity switching may be accomplished. Output A is a normally closed contact and outputs B, C and D are normally open. The reed relay contacts are rated for 10 VA at 0.5 amp max./200 V max. Optional normally open mercury wetted relays are available with a 25 VA at 1.0 amp max./1000 V max. rating. The TRS04VD is sold as an assembled and tested 2½" x 3½" circuit board module.

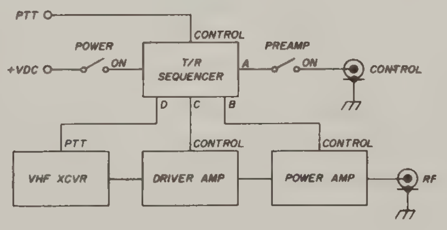
The following diagrams indicate the connection of the TRS04VD. At B the setup for use with an hf transceiver/transverter system is quite straightforward. As shown the D output of the TRS04VD is not used. At C the sequencer is shown controlling a system using a vhf transceiver. Here the TRS04VD control signal is from a PTT microphone or foot switch. The D output from the sequencer is used to key the PTT line of the transceiver. VOX operation is not afforded in this configuration. A minor modification of the vhf transceiver to separate the internal VOX and PTT circuitry would restore VOX operation in this system. The transceiver VOX circuitry would supply the control signal to the sequencer and output D would key the vhf transceiver.



A



B



C

Advanced Receiver Research

P.O. Box 1242 • Burlington, CT 06013 • 203-582-9409

Ar² COMMUNICATIONS PRODUCTS

Gunnplexer Equipment

PART NUMBER	*DESCRIPTION*
MA87108-1	10 mW Oscillator & Varactor
MA87108-2	20 mW Oscillator & Varactor
MA87108-3	35 mW Oscillator & Varactor
MA87108-10	100 mW Oscillator & Varactor
MA87127-1	10 mW Transceiver Assembly
MA87127-2	20 mW Transceiver Assembly
MA87127-3	35 mW Transceiver Assembly
MA87127-10	100 mW Transceiver Assembly
MA87140-1	10 mW Transceiver & Horn Antenna
MA87140-2	20 mW Transceiver & Horn Antenna
MA87140-3	35 mW Transceiver & Horn Antenna
MA87141-1	Two (2) 10 mW Transceiver & Horn Antenna
MA87141-2	Two (2) 20 mW Transceiver & Horn Antenna
MA87141-3	Two (2) 35 mW Transceiver & Horn Antenna
MA87141-10	Two (2) 100 mW Transceiver & Horn Antenna
MA86555	2 Ft. Solid Parabolic Antenna
MA86556	4 Ft. Solid Parabolic Antenna
MA86551	17 dB Horn Antenna
MA86552	17 dB Horn Antenna (24 GHz)
MA87820	25 mW Transceiver & Horn Antenna (24 GHZ)
MA87820-4	Two (2) 25 mW Transceiver & Horn Antenna (24 GHz)
DG87141-1	Replacement 10 mW Gunn Diode
DG87141-2	Replacement 20 mW Gunn Diode
DG87141-3	Replacement 35 mW Gunn Diode
DG87141-10	Replacement 100 mW Gunn Diode
DV87141-1	Replacement Varactor Diode
DD87141-1	Replacement Detector Diode

Advanced
Receiver
Research

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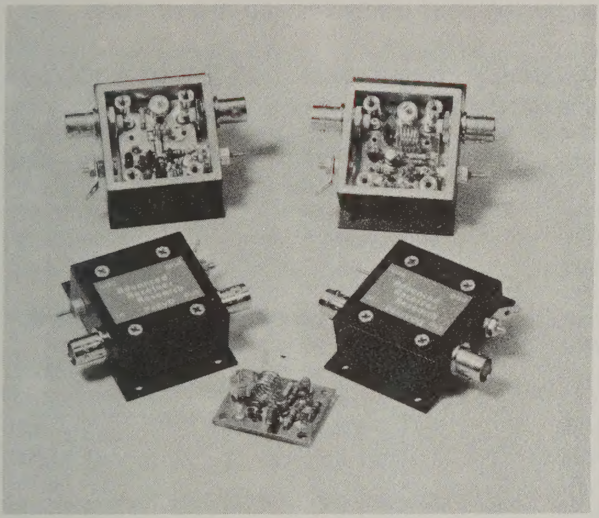
Ar² COMMUNICATIONS PRODUCTS

High Performance Hf, Vhf, Uhf Preamplifiers



Features:

- *Low noise figure*
- *High immunity to overload*
- *Completely shielded*
- *Suitable for mast/tower mounting*
- *Small size*
- *Rugged low profile custom enclosure*

Series PXXXVD, PXXXVDA and PXXXVDG preamplifiers have been designed for the most demanding amateur, commercial and military applications. Each model has been optimized for lowest noise figure consistent with excellent strong signal handling capability. These preamplifiers are suitable for use in any receiver or converter/receiver system. Each preamplifier is housed in a rugged low profile custom aluminum enclosure finished with military grade black acrylic-urethane enamel. Female BNC coaxial fittings are provided for the input and output connections. Other connectors or connector combinations are available (contact factory). Complete rf shielding is maintained with a feedthrough capacitor for the dc power connection. Mounting holes, suitable for no. 6 hardware, are located at each corner of the bottom plate.

Several models of preamplifiers are available for most frequency ranges. Selection of the most suitable model for a particular application will depend primarily on the noise figure and overload characteristics required. Preamplifier models using dual-gate MOSFET and bipolar transistor devices (part numbers with suffix VD or VDA) are suitable for most scatter, tropo, satellite, ATV, repeater and radio telescope applications. Gallium-arsenide FET (GaAsFET) preamplifiers (part numbers with suffix VDG) provide the lowest noise figures and highest immunity to overload of any preamplifier types. These preamplifiers would be well-suited for very low signal level work, either terrestrial or earth-moon-earth (EME) communications, or in areas where strong signal levels are normally a problem.

Amplifying devices used in the preamplifiers are as follows: P28VD, P50VD, P136VD, P144VD, P220VD - 3N204; P136VDA, P144VDA, P220VDA - 3SK48; P432VD - MRF-901; P432VDA - NE64535; P50VDG, P144VDG, P220VDG, P432VDG -MGF-1400. Special attention has been paid to power supply transient protection and destructive gate voltage charge protection in the GaAsFET preamplifiers. Each and every preamplifier is precision aligned on our noise figure measuring equipment and should provide long trouble-free operation.

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All preamplifiers are designed to be powered by a 10-16 volt dc source at a maximum of 20 mA. Low power consumption along with small size make these preamplifiers ideal for installation within existing equipment or systems, or for remote mounting at the antenna. Mounting the preamplifier at the antenna will provide the best system noise figure.

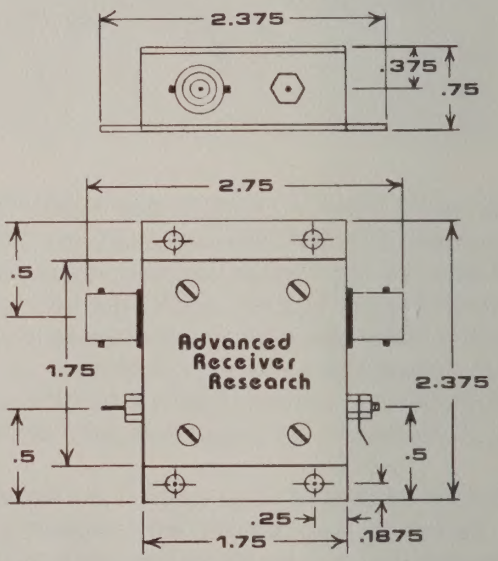
All preamplifiers are available without case and connectors for installation within equipment. The circuit board module measures 1-1/8 x 1-3/8 inches and is supplied with a length of miniature coaxial cable and generalized installation instructions. Specify as PXXXVD/NC.

All Advanced Receiver Research products are covered by a full one year warranty. Instruction sheet and schematic diagram furnished on request. If you're serious about hf, vhf, uhf and microwave communications make Advanced Receiver Research high performance equipment a part of your communications system.

Note: *Advanced Receiver Research manufactures a broad line of frequency converters, low-noise preamplifiers and broadband amplifiers for many frequency ranges not listed here. Contact the factory with your specific requirements.*

Specifications:

Model	Freq. Range (MHz)	N.F. (dB)	Gain (dB)	1dB Comp. (dBm)	1dB Bandwidth (MHz)	Device Type
P28VD	*28-30*	*< 1.1*	*15*	*0*	*2.5*	*DGFET*
P50VD	*50-54*	*< 1.3*	*15*	*0*	*5*	*DGFET*
P50VDG	*50-54*	*< 0.5*	*24*	*+ 12*	*4*	*GaAsFET*
P136VD	*136-138*	*< 1.5*	*15*	*0*	*8*	*DGFET*
P136VDA	*136-138*	*< 1.0*	*15*	*0*	*8*	*DGFET*
P136VDG	*136-138*	*< 0.5*	*24*	*+ 12*	*7*	*GaAsFET*
P144VD	*144-148*	*< 1.5*	*15*	*0*	*8*	*DGFET*
P144VDA	*144-148*	*< 1.0*	*15*	*0*	*8*	*DGFET*
P144VDG	*144-148*	*< 0.5*	*24*	*+ 12*	*7*	*GaAsFET*
P220VD	*220-225*	*< 1.8*	*15*	*0*	*10*	*DGFET*
P220VDA	*220-225*	*< 1.2*	*15*	*0*	*10*	*DGFET*
P220VDG	*220-225*	*< 0.5*	*20*	*+ 12*	*12*	*GaAsFET*
P432VD	*420-450*	*< 1.8*	*15*	*− 20*	*40*	*Bipolar*
P432VDA	*420-450*	*< 1.1*	*17*	*− 20*	*40*	*Bipolar*
P432VDG	*420-450*	*< 0.5*	*16*	*+ 12*	*40*	*GaAsFET*
PGP30VD	*29-31*	*< 1.1*	*15*	*0*	*2.5*	*DGFET*



Supply voltage: 10-16 Vdc
Supply current: 20 mA max.
Weight: 2.0 oz.

Advanced Receiver Research

PRICE LIST — AMATEUR

P. O. Box 1242
Burlington, CT 06013
Telephone: (203) 485-0310, 485-0311, 582-9409, 584-0776

This Price Sheet effective 4/86. Prices subject to change without notice.

DD87141-1	$ 10.69
DG87141-1	29.17
DG87141-2	37.35
DG87141-3	49.96
DG87141-10	57.60
DV87141-1	21.88
GPMN30VD	$ 4.25
MA86551	$ 18.75
MA86555	262.45
MA86556	417.84
MA87108-1	89.85
MA87108-2	139.59
MA87108-3	207.28
MA87108-10	247.28
MA87127-1	135.16
MA87127-2	211.58
MA87127-3	270.27
MA87127-10	310.27
MA87140-1	163.40
MA87140-2	237.78
MA87140-3	297.44
MA87140-10	337.44
MA87141-1	264.55
MA87141-2	452.37
MA87141-3	568.10
MA87141-10	648.10
MA87820	369.60
MA87820-4	739.20
MM28VD	$249.95
MM28VDG	299.95
MM50VD	249.95
MM50VDG	299.95
MM136VD	249.95
MM136VDA	257.95
MM136VDG	299.95
MM144VD	249.95
MM144VDA	257.95
MM144VDG	299.95
MM220VD	249.95
MM220VDA	257.95
MM220VDG	299.95
MM432VD	252.95
MM432VDA	269.95
MM432VDG	299.95
MMXXX w/o preamp	229.95

MML28VD	
MML28VDG	179.95
MML50VD	
MML50VDG	179.95
MML136VD	
MML136VDA	
MML136VDG	179.95
MML144VD	
MML144VDA	
MML144VDG	179.95
MML220VD	
MML220VDA	
MML220VDG	179.95
MML432VD	
MML432VDA	
MML432VDG	179.95
P28VD	$ 29.95
P28VDG	79.95
P50VD	29.95
P50VDG	79.95
P136VD	29.95
P136VDA	37.95
P136VDG	79.95
P144VD	29.95
P144VDA	37.95
P144VDG	79.95
P220VD	29.95
P220VDA	37.95
P220VDG	79.95
P432VD	32.95
P432VDA	49.95
P432VDG	79.95
P1-30/20VD	$ 32.95
PGP30VD	29.95
P28VD/NC	$ 19.95
P28VDG/NC	69.95
P50VD/NC	19.95
P50VDG/NC	69.95
P136VD/NC	19.95
P136VDA/NC	27.95
P136VDG/NC	69.95
P144VD/NC	19.95
P144VDA/NC	27.95
P144VDG/NC	69.95
P220VD/NC	19.95
P220VDA/NC	27.95
P220VDG/NC	69.95
P432VD/NC	22.95
P432VDA/NC	39.95
P432VDG/NC	69.95

P1-30/20VD/NC	$ 22.95
PGP30VD/NC	19.95
PWR01VD	$ 32.95
R50VD	$ 69.95
R50VDA	94.95
R136VD	69.95
R136VDA	94.95
R144VD	69.95
R144VDA	99.95
R220VD	69.95
R220VDA	99.95
R432VD	79.95
R435VD	79.95
R432/435VD	89.95
R432VDA	
RXMR30VD	$119.95
SL01VD	$ 49.95
SP28VD	$ 59.95
SP50VD	59.95
SP50VDG	109.95
SP144VD	59.95
SP144VDA	67.95
SP144VDG	109.95
SP220VD	59.95
SP220VDA	67.95
SP220VDG	109.95
SP432VD	62.95
SP432VDA	79.95
SP432VDG	109.95
TR10GA-10mW	$399.95
TR10GA-20mW	478.95
TR10GA-35mW	540.95
TR10GA w/o Gunnplexer	279.95
TRS04VD	$ 49.95

Note:
NC-Denotes no case or connectors